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ABSTRACT

Children's acquisition of agent nouns within a framework of morphological structural principles is explored. Language acquisition has been conceptualized as a process of parameter setting in which the learner is richly endowed with a vocabulary of primitives and rule schemata. Exposure to the primary data will be filled in from the range of options allowed by universal grammar. It is argued that while it may initially appear that learners are using rules that are incorrect for analyzing the particular data, these rules actually fit into the larger system the learners are acquiring. Children's use of morphological structural principles in agent noun acquisition was evaluated in an experiment involving 21 children between the ages of 3 and 7. The results were consistent with the hypothesis that children's grammars reflect morphological structural principles within a framework which takes into account the logic of learnability. (RW)

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The Acquisition of Agents:
morphological and semantic hypotheses

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Several areas of research have been coming together recently which makes language acquisition a very exciting field to be working in at the moment. Recent discussions among linguists and psychologists have been focusing on learnability -- that is, language acquisition viewed as a "logical" problem. Questions about the form of UG and the negative evidence problem are being considered together with the adult target grammar, on the one hand, and with the course of acquisition -- especially the mistakes that learners make -- on the other. In one framework, which is being explored (one which I'll be assuming), language acquisition is a process of parameter setting in which the learner is richly endowed with a vocabulary of primitives and rule schemata. Exposure to the primary data will determine how particular variables will be filled in from the range of options that UG allows. Various proposals have been made within this framework, Pinker (1980) and Roeper (1982) among them.

I want to discuss a problem in the acquisition of agents in this framework, and argue that while initially it might look like learners are using rules which are incorrect for analyzing the particular data, it makes sense for them to be using these rules, since they fit into the larger system which they are acquiring. Clark and Hecht (this volume) discuss a set of pragmatic principles which move children from using compounds to form agents to using the -er affix productively and consistently. The present study addresses a different aspect of the acquisition of agents: based on the development of their understanding of agent nouns, what specific evidence is there on grammatical development? In particular, what sort of evidence do we have that children use morphological structural principles? How do learners' initial forms reflect the Universal Grammar morphological system and their eventual finding of the right parameters for their language?

The agents I am discussing appear in (1). Since they are created by a rule of morphology, I call them morphological agents.

(1) morphological agents

skier
diver
singer (of sad songs)
driver (of big rigs)

In discussing these, I will be comparing them to non-morphological agents that I call semantic agents. They appear in (2).

(2) semantic agents

chef
ballerina
dentist
nurse

The two types of agents pattern differently with respect to direct objects. Morphological agents, like their underlying verbs, allow direct objects (as the second two examples in (1) illustrate);

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semantic agents do not. Thus, phrases such as * a chef of great meals and * a ballerina of complicated steps are ungrammatical. The two types of agents pattern identically with respect to all other complement types, and here, morphological agents do not pattern like verbs. So we see the distribution in (3)-(5).

- (3)
 - a. a ballerina in a bathtub
 - b. a dancer in a bathtub
 - c. to dance in a bathtub
- (4)
 - a. a chef with a Cuisinart
 - b. a baker with a Cuisinart
 - c. to bake with a Cuisinart
- (5)
 - a. a soprano under the bed
 - b. a singer under the bed
 - c. to sing under the bed

The PPs in the (c) examples are all interpreted as modifiers of activity. The PPs in the (a) examples, with semantic agents, are interpreted as modifiers of the person; in (4a), the chef has a Cuisinart. In the (b) cases, although the PPs are interpretable as parallel to the (c) cases (a "baker with a Cuisinart" would mean "someone who bakes with a Cuisinart"), they are ungrammatical under this interpretation.

We can see this more clearly if we look at some complements which do not have any possible interpretations as "person" modifiers. In (6) and (7), the PPs in the (b) cases are ungrammatical, like the (a) cases, in which the head is a simple agent noun, and unlike the (c) cases, in which the head is the corresponding verb.

- (6)
 - a. * a ballerina into the room
 - b. * a dancer into the room
 - c. to dance into the room
- (7)
 - a. * a pilot through clouds
 - b. * a flier through clouds
 - c. to fly through clouds

Thus, there seems to be a restriction in adult grammar on the types of complements that morphological agents can take. Note that although the restriction might look like it applies to nouns in general (given the behavior of complements to the semantic agents) it does not. The cases in (8) illustrate deverbal -ing nouns whose modifiers are interpreted with just these sorts of verbal readings.

- (8)
 - a. The flying of planes over this city
is prohibited
 - b. The singing of songs into tape
recorders requires no special skill
 - c. The drinking of great quantities
of liquid through straws can
endanger the cheek muscles

In some striking data from spontaneous speech and a subsequent pilot study, it seemed that children do not start out restricting the morphological agents in this way; they appeared to allow the verbal-modifier reading that I have been discussing, the interpretation which is ungrammatical for adults.

The experiment to be reported here tested 21 children between the ages of 3 and 7 on this question, focusing on their interpretation of morphological agents such as those in (9).

- (9) a diver without a mask
 a drummer without sticks
 a rider of a bicycle without hands

For each phrase of the type shown in (9), the children saw arrays such as Figure 1, and were asked, for example, "Can you show me all of the pictures of a diver without a mask?" For this phrase, only picture 3

FIGURE 1



is the correct choice, since here the diver has no mask. Picture 2 is not a correct choice, since the diver has a mask. Before I discuss in detail how the children treated these forms, I want to discuss two pretests which were necessary to make the results of the study interpretable.

Pretest 1 was similar to Clark and Hecht's (1982) study, investigating the acquisition of agents without complements. In their experiment, children of 3 could successfully identify ex agents and by 4, they were consistently able to produce them. The pretest for the present study corroborates these findings. (A full report appears in Randall (1982).)

A second pretest was necessary in order to interpret the children's responses to the PPs in phrases like (9). This pretest ensured that both noun-modifier and verb-modifier readings are available to the children for PPs like without a mask.

For a test of verb modifiers, I used the verb counterparts to the morphological agents in (8) and the same arrays of pictures (though the design insured that each child saw each array with either the agent or the verb question. For Figure 1, the verb counterpart was tested by asking, "Can you show me all of the pictures of a man diving without a mask?" For this question, both pictures 3 and 2 are correct choices.

In the test for the noun-modifier readings, the children heard ordinary non-agentive nouns with PPs such as a boy without shoes or a horse with a hat, and saw an array such as Figure 2. (Note that the array has two pictures which contain a horse and a hat, but only one, picture 3, which contains what counts as a horse with a hat.)

The children's responses to the noun and verb pretests are quite straightforward. They look exactly like those for the group of 12 adults who served as a control group. The responses for both groups appear in Table 1.

For the noun-modifier examples, pictures 1 and 2, which are incorrect, were chosen 0% of the time by both the children and the adults. Picture 3, the correct choice, was always chosen. The responses to the verb-modifier examples were also consistently correct, for both the children and the adults. The incorrect picture 1 was never chosen by either group, while pictures 2 and 3, both correct

FIGURE 2

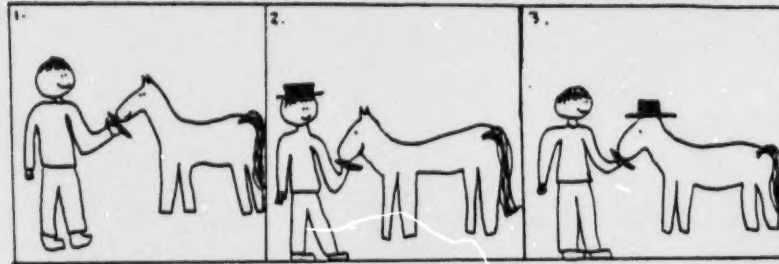


TABLE 1

Non-agents: with NP and VP modifiers
 Percentage of responses in which each picture was included

Noun modifier

a horse with a hat

*1	0%	0%
*2	0%	0%
3	100%	100%

Verb modifier

a man diving without a mask

*1	0%	0%
2	100%	100%
3	100%	100%

children	adults
N=18	N=12

under a verb-modifier reading of the PP, were always selected. Notice that picture 2 is the crucial choice for the verb-modifier reading of the PP. The diver is "diving without a mask" though he is not "without" a mask.

Having seen that the children control both noun- and verb-modifier readings for PP complement phrases, we can now look at the results for the agent nouns in (9), forms like, a diver without a mask

Considering Figure 1 once again, the correct response for these phrases is picture 3 only. The adults in the study showed this response pattern; the children, however, did not. Table 2 contains the data.

While picture 2 was never selected by the adults for a diver without a mask, it was selected 82% of the time in the children's responses. It appears that it is being treated like the verb example just discussed, a man diving without a mask. There are two possible

TABLE 2

Agents: with NP "without" modifiers
 Percentage of responses in which each picture was included

<u>Morphological -er agents</u> a diver without a mask		
	children	adults
	N=18	N=12
*1	0%	0%
*2	82%	0%
3	100%	100%

explanations for the children's pattern; each makes a different prediction. The first is based on a morphological analysis, the second, on semantic inference. The morphological explanation is as follows.

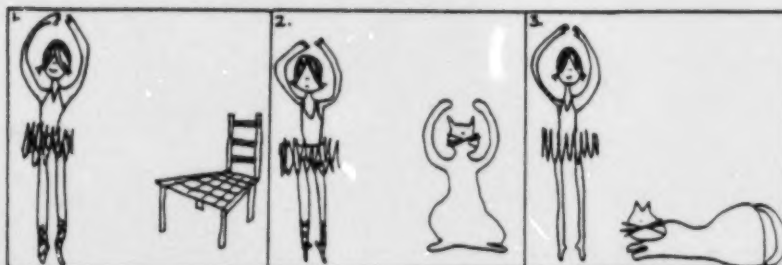
Since the morphological agents such as diver and drummer are formed from verbs, the children could be treating their complements like the complements of their underlying verbs, "inheriting" the subcategorized-for verb complements into the subcategorization of the derived nouns. If this were true, then it would predict a difference between morphological agents, which are derived from verbs, and semantic agents, such as chef or dentist, which are not. Complements to these non-derived forms should be treated as noun complements, since there is no verb inside the noun from which they could have been inherited. They should never receive a verbal interpretation unless the child assumes an underlying verb.

There is another, alternative, explanation for the results, however. It is possible that some sort of semantic "inference" is responsible for the children's treatment of the complements in these forms. It is not implausible to infer that if someone is a diver, then he is diving, and if someone is a diver, without a mask, then he is diving without a mask. But this explanation makes the opposite prediction from the morphological explanation. That is, if an inference is plausible in the cases of deverbal agents, diver and drummer, then it is just as plausible in the cases of semantic agents, chef and ballerina. A dancer without shoes and a ballerina without shoes should be treated identically if the inference hypothesis is correct.

The two hypotheses were tested in several ways, and a full report of the experiments appears in Randall (1982). The most striking results involve prepositional phrase complements of the form with NP, in the two types of agent phrases: morphological agents such as a dancer with a cat and semantic agents such as a ballerina with a cat. The interesting aspect of the with phrases can be seen in picture 3 of Figure 3.

Notice that in both pictures 2 and 3 a cat appears, but only in picture 2 is the activity involving the cat, that is, only in picture 2 is there a verbal modifier possibility for the PP, with a cat. But because of the meanings of the phrases, picture 3 is also correct for both types of agents, since the agent can be said to be "with the cat" whether the cat is involved in the activity or not. (Recall that this was not the case for the without examples.) Given these facts, we

FIGURE 3



should not expect to find evidence about the morphological/semantic question here, unless the children are not just allowing a verbal modifier reading for these PPs, but requiring it. Any time a child fails to choose picture 2, it must be that he is requiring a verbal interpretation for the PP. The data appear in Table 3.

TABLE 3

Two types of agents with NP "with" modifiers
Percentage of responses in which each picture was included

Morphological -er agents
a dancer with a cat

*1	0%	0%
2	81%	100%
3	70%	100%

Semantic agents
a ballerina with a cat

*1	0%	0%
2	100%	100%
3	100%	100%

children adults
N=18 N=12

Consider first the bottom half of the table, the responses to forms like a ballerina with a cat. For both the children and the adults, all of the pictures in which a cat appears were selected, regardless of its involvement in the activity. The cat did not have to be dancing. With a cat, was treated as a NP modifier.

In the top half of Table 3 are the responses to the phrase type, a dancer with a cat, the corresponding morphological agents. There are several things to point out. First of all, picture 3, in which the prepositional object appeared but was not involved in the verbal activity, should have been chosen 100% of the time, as in the "ballerina" case. For the adults, it was. For the children, however, it was selected only 70% of the time (as compared to 100% in the

"ballerina"-type phrases), significantly less often ($p < .01$). This is evidence against the prediction made by the semantic explanation, that semantic agents like ballerina and morphological agents like dancer would be treated identically.

The second point of interest comes from the fact that in the cases of the morphological agents we might have expected 100% of the choices to include activity-modification pictures like picture 2, rather than only 81%. Why do we see less than 100% here? Again, the answer is attributable only to a morphological rather than a semantic explanation. If this were not so, then the semantic agents would have been treated similarly, with fewer than 100% selections including picture 2 as well.

The explanation lies, most probably, in the fact that the morphological agent phrases are ambiguous for the children, because the PP is interpretable for them as a verbal modifier and as a noun modifier (as illustrated in Table 2). This ambiguity could lead children to ignore one or the other of the readings (a well-attested strategy for alleviating ambiguity.) A child who chooses only activity pictures is limiting the PP to an interpretation as a verb complement, and is ignoring its possible interpretation as a NP complement. A child who chooses the non-activity pictures is alleviating ambiguity by eliminating the picture choices to which both readings of the PP are applicable and choosing a set which can only be described by a NP-modifier interpretation of the PP. The striking fact overall is that the results show a clear difference between semantic agents and morphological agents, a fact which is consistent with a morphological explanation for the data in Table 2 as well.

Let us turn now from these specific results to the larger picture. Why should children start out allowing PP modifiers on verbs inside morphological agents to be inherited? That is, why would they allow a verb-modifier reading for complements to -er agents? To what advantage is it? To answer this, we must consider the adult grammar, in particular, the properties of the morphological component which determine the complement structures for derived forms. It turns out that verb modifiers can be inherited into forms derived from verbs in most cases. (For a defense of this position, see Randall (1982); for an alternative view, see Roeper (1982).) The schema looks like (10).

(10)

		category change	
		+	-
meaning change	+	no inheritance	inheritance
	-	inheritance	inheritance

When an affix applies to a verb and changes both category and meaning as the -er agent affix does, PP modifiers on verbs cannot be inherited. When the affix changes only one of these, either category or meaning, or neither, then inheritance can occur. Examples of this appear in (8), above, where the -ing affix changes category but not meaning, allowing the verbal complements to be inherited.

A further fact is clear from children's spontaneous speech data

(as in Bowerman's data in (11)); children inherit verbal modifiers where adults do not. If Universal Grammar parameters allow inheritance except when category and meaning both change, and if these two indices of change become available to the learner eventually, then any overgeneralization of inheritance that occurs will disappear. In the complete report of this study, I show that learners are able to

- (11) "unpress it out" E. 4.11
 "untake it off" E. 3.5

(from Bowerman, (1978))

retreat from inheritance as soon as they see for a certain form that it belongs to a class of forms that differ from their base verbs in two ways (category and meaning both).

So, in fact, this sort of overgeneralization of inheritance is just what we would expect in a system in which the learner generalizes across cases which are formally related, the way deverbal forms are in morphology. No semantic principle or set of principles, nor any learning strategy predicts these facts; a learnability account which considers the parameters of adult morphology does predict them.

In this study, I hope to have shown how children's grammars reflect structural principles which are independently motivated for the adult system, in a framework which takes into account the logic of learnability. It is because frameworks are developing that allow us to consider a variety of evidence together -- data from linguistic theory, predictions from learnability, and child language-- that explanations like this one are available to enlighten our models of how children learn language.

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